What is claimed is:

1. A method for PCR amplification and detection of nucleotide sequences,
comprising the following steps:

a) using an array of a plurality of microspots forming analytical positions, said microspots comprising as probe molecule at least one immobilized oligonucleotide which is hybridizable with a target sequence to be identified of a DNA fragment,

b) applying an analyte solution comprising PCR reagents and a plurality of target sequences to the microspots in such a way that it completely covers the array,

c) subjecting the array to a thermocycling process in order to amplify the target sequences,

d) detecting hybridization events on probe molecules immobilized at one analytical position with the aid of a microelectrode arrangement.

2. The method as claimed in claim 1, characterized in that a hydrophilic reaction layer (14) having coupling groups for covalent binding of probe molecules is used.

3. The method as claimed in claim 2, characterized in that the reaction layer (14) used is a hydrogel.

4. The method as claimed in claim 2 or 3, characterized in that a free-radically crosslinkable hydrogel based on acrylamide with maleic anhydride and/or glycidyl (meth)acrylate as coupling groups is used.

5. The method as claimed in any of claims 1 to 4, characterized in that a biochip comprising a semiconductor layer and an insulating layer (13) connected therewith is used, the side of the latter, which faces away from the semiconductor

layer, carrying the electrode arrangement (5) and the reaction layer (14).

6. The method as claimed in claim 5, characterized in that the semiconductor layer used is a silicon layer (12).

7. The method as claimed in any of claims 1 to 6, characterized in that an analyte solution is used which comprises an external primer pair, i.e. a primer pair which hybridizes with a target DNA outside a target sequence.

8. The method as claimed in any of claims 1 to 7, characterized in that an analyte solution is used which comprises a plurality of DNA fragments having a different target sequence and a single external primer pair suitable for the amplification of all target sequences.

9. The method as claimed in any of claims 1 to 7, characterized in that an analyte solution is used which comprises an external primer acting together with the one strand of at least one DNA fragment and in that a counter strand is elongated within a reaction layer with the aid of an internal primer, i.e. a primer which specifically hybridizes with the target sequence, immobilized there.

10. The method as claimed in any of claims 1 to 7, characterized in that an analyte solution is used in which an internal primer pair specifically hybridizing with a target sequence is immobilized in a microspot.

11. A device for carrying out the method as claimed in claim 1 or in any of claims 2 to 10, comprising a biochip having an array of microspots (4) which form analytical positions and which are covered by a hydrophilic reaction layer (14).

12. The device as claimed in claim 11, characterized in that the biochip with hydrophilic reaction layer (14) is arranged in a housing having an opening for an analyte solution (18).

13. The device as claimed in claim 11, characterized in that the biochip contains carriers for the microspots (4) as substrate (2).

14. The device as claimed in claim 11, characterized in that the substrate (2) consists of a semiconductor material, in particular silicon (Si), to which an insulating layer (13) has been applied.

15. The device as claimed in claim 11, characterized in that the biochip is a prefabricated silicon chip having thin-layer microelectrodes (6a, 7a; 24, 25) implemented therein.